TikZ is more than meets the eye

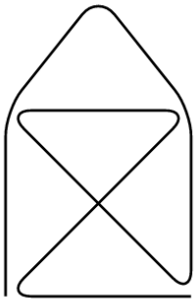
The name of the software/package TikZ is an acronym, in German, for “this is not a drawing program”. Quoting the TikZ manual: *you “program” your graphics, just as you “program” your document when you use TEX. You get all the advantages of the “TEX-approach to typesetting” for your graphics: quick creation of simple graphics, precise positioning, the use of macros, often superior typography. You also inherit all the disadvantages: steep learning curve, no wysiwyg [what you see is what you get], small changes require a long recompilation time, and the code does not really “show” how things will look like.*

In short, TikZ lets you “draw by coding”. It is an excellent and rewarding exercise in coding. Since drawing straight lines is very easy, it can be used as an introduction to coding. TikZ heavily relies on Cartesian coordinates in the plane, so it is a never-ending and colourful exercise in analytic geometry. One can also use polar coordinates and, in general, trigonometric functions are useful to compute the coordinates of points (notice that real numbers only need a couple of digits after the comma so that everything looks perfect).

Some TikZ feature forces the user to think, for example drawing an arc is not what you may guess. Moreover, it is practical to exploit symmetries, making translations.. so you also have exercises with geometrical transformations. Algorithmically, iterations are possible and meaningful.. And some seemingly innocent drawings hide some small (and funny) challenges.

Reading TikZ code is a logical/mathematical/coding exercise. Moreover, the big advantage for coding is that you see every part of your code (graphically depicted), so that you see your mistakes and you know that you are done when your image is precisely what you’d like to have. Moreover, you can often draw by trial and error, adjusting the code as needed (also an instructive exercise).

Some functions (e.g. the rounded corners, see the image below from the TikZ manual) are interesting to investigate (possibly, just with examples}: what does the function do?



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\tikz \draw[thick,rounded corners=8pt]
  (0,0) -- (0,2) -- (1,3.25) -- (2,2) -- (2,0) -- (0,2) -- (2,2) -- (0,0) -- (2,0);
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So if you know a pupil who likes mathematics, you could propose self-study of TikZ (with minor assistance up to the point where the pupil is able to find the answers in manuals and blogs). To be precise, studying TikZ means drawing objects from trivial to complicated, to learn about the different features progressively and always with a concrete aim in mind. And teachers could just give TikZ challenges to their pupils, as individual work or as team work.

This small communication is just to announce a long-term work in progress to exploit the didactical potential of TikZ.